

UNITED STATES INSTRUMENT CORPORATION
SUMMIT, NEW JERSEY

CATALOG 400-A



GRAYBAR ELECTRIC CO., INC.
601 SO. PETERS ST.
NEW ORLEANS 10, LA.

SOUND POWERED

SOUND POWERED TELEPHONES FOR

FUNDAMENTALS

OF USI SOUND POWERED

The voice of the user supplies all the power to operate USI Sound Powered telephones. The voice causes fluctuations in the magnetic circuit of the transmitter which creates an alternating current. This current, too small to be measured by ordinary electric instruments, is transmitted to the receiver where sound waves are created, reproducing the speaker's voice. Speech is transmitted clearly and distinctly without any distortion because all of the static noises usually associated with battery type telephones are eliminated. Satisfactory transmission of 30 miles or more, using No. 22 AWG wire, is assured under normal conditions. Since the magnetic properties of the Alnico magnets which form the heart of USI Sound Powered instruments remain virtually constant, these instruments have an unlimited useful life.

CONSTRUCTION

OF USI SOUND POWERED

All USI Sound Powered instruments are designed throughout to withstand exacting shock, vibration, salt water corrosion, temperature and pressure tests. Molded parts are of impact material which provides maximum resistance to breakage. Metal parts are made of non-corrosive materials wherever possible or are thoroughly protected by plating and chemical treatment. All equipment is precision built and carefully inspected. These high standards are strictly maintained to insure top dependability and performance.

USI EXPERIENCE

IN SOUND POWERED FIELD

In 1937 USI began pioneering the development and manufacture of precision built Sound Powered instruments and systems for every day use. The same qualifications that are so desirable for commercial applications proved even more valuable for combat communications and, in consequence, the entire output of our plant during World War II was devoted to production for the U. S. Navy, Maritime Commission and the Army Signal Corps. USI Sound Powered telephones proved themselves under the most rigorous conditions in all parts of the world, and we mention with pride our receipt of the Army-Navy "E" Award for Production Excellence. Our experience is now used in bringing you ever better communication.

APPLICATIONS — The Sound Powered principle, eliminating the use of any outside power source, makes possible many new applications and improves performance in familiar ones.

PORTABLE — Because USI Sound Powered telephone handsets and headsets need no batteries and are readily portable, they are used for testing and repairing a wide variety of electrical installations such as adjusting television antenna, elevator circuits, railroad circuits, etc. This is important to:

RADIO & TELEVISION INSTALLATIONS	ELECTRICAL CONTRACTORS
CONSTRUCTION & RE- PAIR CREWS	TELEPHONE INSTALLATIONS
PUBLIC UTILITIES	RAILROAD MAINTENANCE
AND TO ALL WHO INSTALL AND MAINTAIN COMPLICATED ELECTRICAL EQUIPMENT.	

RELIABLE — Since no outside power is used, reliable service is assured at all times, even in the event of power failures. This is especially important for:

MARINE TELEPHONES	VAULTS
PUBLIC UTILITIES	REFRIGERATION
POLICE & FIRE RESCUE CREWS	PLANTS
WHEREVER UNINTERRUPTED COMMUNICATION IN AN EMERGENCY IS ESSENTIAL.	

SAFE — Because of the explosion-proof feature — see Bureau of Mines approved types — this equipment is of special interest to:

MINES	ARSENALS AND POWDER WORKS
OIL REFINERIES	FLOUR MILLS
CHEMICAL PLANTS	GAS WORKS
AND OTHER OPERATIONS WHERE EXPLOSIVE GASES OR DUST MAY BE PRESENT.	

HIGH NOISE AREAS — Clear, distinct reception, together with high sensitivity, assures excellent performance in locations having high noise levels such as:

HEAVY MANUFACTURING CONSTRUCTION PROJECTS SHIPBUILDING	CAN MANUFACTURING GROUND TESTING AIRCRAFT SPORTS ARENAS AIRPORTS
AND OTHER NOISY LOCATIONS.	

REMOTE INSTALLATIONS — Owing to the independence from outside power, service can easily be provided in remote areas for permanent or semi-permanent installations, such as:

GEOPHYSICAL OPERATIONS RANCHING AND FARMING FORESTRY AND LUMBERING	RECLAMATION PROJECTS OIL WELL DRILLING RAILROADS
AND SIMILAR OPERATIONS.	

DEPENDABILITY and PERFORMANCE

HANDSET and HEADSET

Instruments

OPERATION OF U S I INSTRUMENTS

For portable use, ordinary rubber covered electrical extension cord with two copper conductors, insulated and twisted into a pair, is recommended. Telephones should be connected in parallel with all connections insulated. Polarity does not affect performance. Separate equipment and wiring should be furnished if ringing is required. Batteries or other external power should not be applied to the voice circuit.

WEATHERPROOF HANDSETS

No. A-257-4 USI Weatherproof Sound Powered Handset with built-in press-to-operate switch is recommended for heavy duty uses or where portability is desired. When the button of the press-to-operate switch is depressed, the handset is connected to the line. Supplied with 4½ feet of rubber covered cord. Weight is 22 ounces without cord.

No. A-277-1 USI Weatherproof Sound Powered Handset without built-in switch is made especially for heavy duty portable use in testing operations. It is supplied with 4½ feet of rubber covered cord which has free ends, one foot long, equipped with No. 45 C Mueller test clips. Weight is 20 ounces without cord.

No. A-277 Similar to No. A-277-1 above, but has 4½ feet of rubber covered cord without test clips.

STANDARD HANDSETS

No. A-276 USI Standard Sound Powered Handset is recommended for indoor use. It is furnished without built-in switch. Supplied with 4 feet of brown-braid cord. Weight is 20 ounces without cord.

No. A-292 USI Standard Sound Powered Handset is similar to No. A-276, but is supplied with built-in press-to-operate switch. Weight is 22 ounces without cord.

COAST GUARD HANDSETS

No. A-257-2 and **Type 333** are both Weatherproof Sound Powered Handsets which are approved by the U. S. COAST GUARD. They will be supplied where COAST GUARD approval is required. Details on request.

SPECIAL HANDSETS

Handsets providing special switching requirements can be made up on order as can handsets with three or four conductor cords.

HEADSETS

No. A-330 USI Sound Powered Weatherproof Headset-Transmitter of heavy duty design is recommended as an all-around instrument wherever it is desirable to have the operator's hands free. Furnished with built-in press-to-talk switch which controls the transmitter only. Supplied with 20 feet of rubber covered cord. Weight without cord is 46 ounces.

No. A-337 USI Sound Powered Weatherproof Double Receiver Headset is supplied with 15 inch rubber covered leads joined to a junction box 1¾ inches in diameter with a rubber covered lead of 4½ feet. Weight without cord is 16 ounces.

No. A-332 USI Sound Powered Weatherproof Single Receiver Headset is supplied with 19 inches of rubber covered cord. Weight without cord is 8 ounces.

POCKET TELEPHONE

No. A-278 USI Sound Powered Pocket Telephone, a combined receiver and transmitter, is an easily carried instrument convenient for tests or periodic reports. Supplied with 3½ feet of rubber covered cord. Weight is 7 ounces without cord.

INSTRUMENT UNITS

No. UA-729 USI Sound Powered Units are now serving as microphone and receiving units in diversified products such as gas masks, power megaphones, and geophysical instruments. Standard units are available with impedances of approximately 250, 1250 or 1500 ohms at 1000 cycles. Units with impedances in the approximate range of 60 to 1500 ohms at 1000 cycles can be furnished on special order. Supplied with an anodically treated aluminum diaphragm grill, painted black, and impact bakelite cover having either screw terminals or slide contacts. Please specify your exact requirements.

MOUNTING HOOKS

No. 1113 USI Standard Mounting Hook for left hand mounting is a one-piece aluminum casting finished in black. Weight is 2 ounces.

No. 1964 Similar to No. 1113 above, but for right hand mounting.

No. A-281 USI Shockproof Mounting Hook is intended for use where there is motion, vibration or shock. The receiver end of the handset is held by a rubber padded fork; the transmitter end by a coil spring covered by bakelite rollers. The aluminum frame is finished gray. Weight is 9½ ounces.

No. A-325-1 This mounting hook is similar to No. A-281, but provides for various switching arrangements in the base which are activated by removing or replacing the handset. Details on request.

NO. A-257-4



NO. A-278



NO. A-281



NO. A-330

NO. UA-729



NO. 1113

NO. A-276



Features of

Description of Station Components

Each station consists of a Sound Powered Telephone Handset mounted on a waterproof cast aluminum case, which contains a 1200 cycle magneto generator, a howler unit with connecting horn, the necessary terminal blocks and, if selective ringing is required, a rotary selector switch.

USI Weatherproof Sound Powered Handset No. A-257-4 incorporates a press-to-operate switch in the handle and is supplied with 3½ feet of rubber-covered cord. When the button is depressed, the handset is connected to the line. Handsets not in use are disconnected from the line and cannot pick up interference in noisy locations.

USI 1200 Cycle Magneto Generator No. A-381 is compact, precision built and of exceptionally sturdy construction, fully protected against corrosion with the rotating armature completely enclosed.

USI Howler Unit No. UA-729-16 is a modified Sound Powered unit having maximum performance at approximately 1200 cycles. The howler signal is amplified by a built-in horn and has an output of 90-95 decibels at 12 feet in the open.

USI Rotary Selector Switch No. UA-1086-2 is used in selective ringing systems having a maximum of eight or sixteen stations. **Switch No. UA-1177-2** is used in systems having twenty-four stations maximum.

The cast aluminum case is ruggedly constructed. An "O" ring gasket insures water tightness when the cover is screwed on. A watertight bushing is provided for the generator handle. Heavy mounting lugs afford the advantages of a three point mounting.

WITH MAGNETO HOWLER CALL

The magneto howlers were developed to obtain a signal that is more distinctive and penetrating and that carries better over high noise levels than the conventional bells or gongs. The howler sound is a warble having a frequency range between 1000 and 1400 cycles per second. Output is 90-95 decibels at 12 feet in the open.

Common Talking—Common Ringing Systems

No. A-402 Station for common talking — common ringing system:

Weight—approximately 7¾ lbs.

Overall size—length 9¾", width 10¾", depth 4¾".

Number of stations per system not limited.

To call: Turn generator crank located on the side of the case. Generator operates howlers at all stations in system except originating station. Station identification by code ring.

To talk: Press and hold down the button on handset.

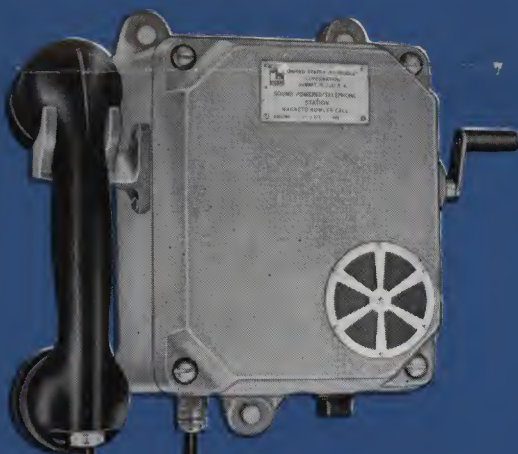
Wiring: Wiring is reduced to a minimum. Two twisted pairs per system of No. 22 AWG or larger. One for calling and one for the telephones. No more than that is needed, regardless of the number of stations in the system. See wiring diagram below.

Common Talking—Selective Ringing Systems

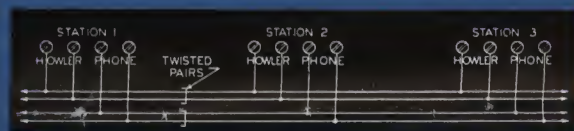
No. A-403 Station for 8 station common talking — selective ringing systems.

Weight—approximately 7¾ lbs.

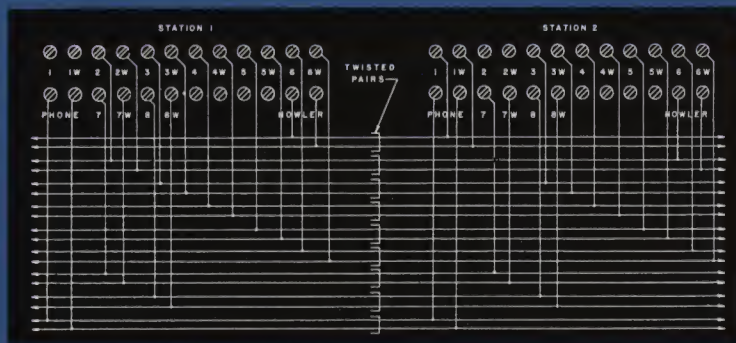
Overall size—length 9¾", width 10¾", depth 4¾".



A-402 STATION



WIRING DIAGRAM FOR COMMON TALKING—COMMON RINGING SYSTEMS



WIRING DIAGRAM FOR 8 STATION COMMON TALKING-SELECTIVE RINGING SYSTEMS
(16 station and 24 station systems similar)

No source of power should be connected to any of these systems.

STATIONS AND SYSTEMS

Maximum number of stations per system is eight. If more than eight stations may be needed for later installation, it is advisable to use No. A-404 or A-405.

To call: Turn selector switch to the desired station and turn the generator handle located on the side of the case. Howler operates only at selected station.

To talk: Press and hold down the button on the handset.

Wiring: Twisted pairs of No. 22 AWG or larger are recommended for both telephone and calling lines to avoid cross talk between howlers and between calling lines and the telephone line. One twisted pair per station for calling plus one twisted pair per system for the telephones. For example, a four station system requires four twisted pairs for calling and one twisted pair for telephones, making a total of five twisted pairs. See wiring diagram below.

No. A-404 Station for 16 station common talking—selective ringing systems.

Maximum number of stations per system is sixteen. Specifications similar to No. A-403 but with 16 position switch and additional terminal blocks. For wiring data see No. A-403.

Other data same as No. A-403.

No. A-405 Station for 24 station common talking—selective ringing systems.

Maximum number of stations per system is twenty-four. Specifications similar to No. A-403 station but with 24 station switch and additional terminal blocks. For wiring data see No. A-403.

Other data same as No. A-403.

Optional Accessories

No. A-410 Auxiliary Howler, connected in parallel with the howler in any station, will provide a call signal at a remote location. Consists of U.S.I. Howler Unit with built-in horn enclosed in cast aluminum case.

Weight—approximately 2 lbs.

Overall size—length 3", width 4", depth 4".

No. A-320 Generator Operated Relay is designed to be operated by any USI No. A-381 Magneto Generator and to control power circuits of 1.5 amperes at 115 volts non-inductive load. Recommended where power horns, whistles or other power equipment are required. Connect in parallel with station howler. It is enclosed in a sheet metal box.

Weight—approximately 1 lb.

Overall size—length 3", width 3", depth 1 3/4".

No. A-336 Generator Operated Relay is similar to above but is enclosed in a spraytight, dustproof case.

No. 2961 Hood may be added to protect any station from falling debris. It is held in place by the two upper mounting lugs. A spacer is provided for the third lug to insure even mounting.

Weight—2 1/4 lbs.

Overall size of station with hood—length 13", width 12 1/2", depth 6 1/2".

INTERSTATION WIRING DATA

for all stations using Magneto-Howler call for distances up to 30 miles.

Where interstation conductors are run in a cable use No. 22 AWG.

For overhead wiring, on poles etc:—Use No. 18 AWG with 40% conductivity solid Copperweld wire. Use 16 AWG with 30% conductivity solid Copperweld wire.

Twisted pairs are necessary for all installations. Where open wire lines are used, frequent transposition should be employed. Wire sizes given above are minimum sizes. On long runs, somewhat better performance may be expected when wire sizes larger than those given above are used.



NO. A-401
STATION
OPEN

All operating parts are mounted on the cover, which lifts off leaving case free for installing wiring.



A-401 STATION

PERMISSIBLE TELEPHONE



APPROVAL NO. 905

ISSUED TO THE

UNITED STATES INSTRUMENT CORP.

CAUTION: The external circuit must be protected against possible contact with power and lighting circuits.

APPROVED BY BUREAU OF MINES

U.S.I. Sound Powered Telephone Stations listed on this page have been tested and approved by the Bureau of Mines, U. S. Department of the Interior, for use in mines. The Bureau states: "Permissible" as used in the schedule means formally approved by the Bureau for use in mine atmospheres that may contain methane or coal dust. The term applies to complete devices that conform in all respects to the design, assembly and methods of use covered by the approval." The approval plate will be placed on all stations listed below.

No shielding or special protection is needed to make these systems explosion-proof throughout, other than the caution against contact with power or light lines noted on the approval plate.

NOTE: Since this equipment is approved by the Bureau of Mines any parts used for renewal or repair must be identical with those furnished.

Common Talking—Common Ringing Systems

No. A-406 Station for common talking — common ringing systems:

Weight—approximately 8 lbs.

Overall size—length 11¼", width 10¾", depth 4¾".

Number of stations per system not limited.

Specifications similar to No. A-402 station but is supplied with terminal tube. For data and wiring diagram see inside page.

Common Talking—Selective Ringing Systems

No. A-407 Station for 8 station common talking-selective ringing system.

Weight—approximately 8¾ lbs.

Overall size—length 11¼", width 10¾", depth 5½".

Maximum number of stations per system is eight.

Specifications similar to No. A-403 station but is supplied with terminal tube. For data and wiring diagram see inside page.

No. A-408 Station for 16 station common talking—selective ringing system.

Weight—approximately 8¾ lbs.

Overall size—length 11¼", width 10¾", depth 5½".

Maximum number of stations per system is sixteen.

Specifications similar to No. A-404 station but is supplied with terminal tube. For data see inside page.

No. A-409 Station for 24 station common talking—selective ringing system.

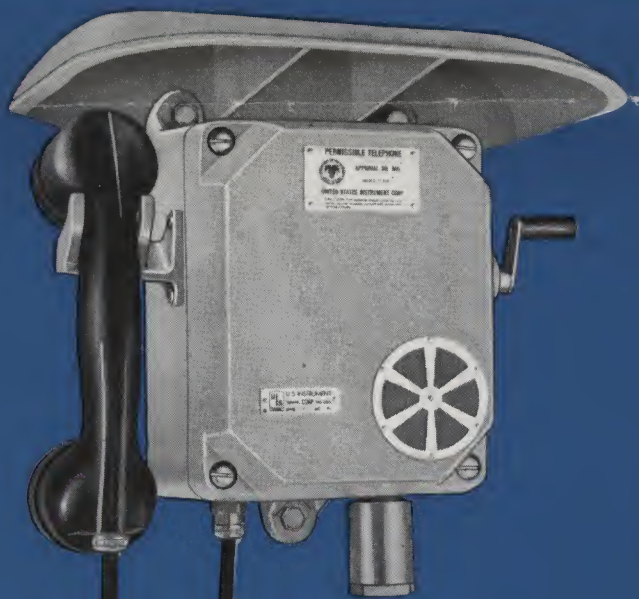
Weight—approximately 9 lbs.

Overall size—length 11¼", width 10¾", depth 5½".

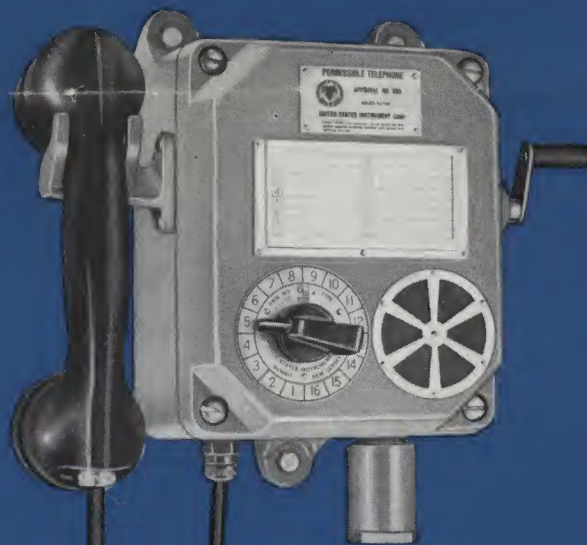
Maximum number of stations per system is twenty-four.

Specifications similar to No. A-405 station but is supplied with terminal tube. For data see inside page.

No. 2961 Hood is optional and may be used with any of the stations listed in this folder. Overall size of stations with hood: Length 13", width 12½", depth 6½". Weight of hood: 2¼ pounds.



NO. A-406 STATION
HOOD OPTIONAL FOR
ANY STATIONS



NO. A-408 STATION

These sets provide an attractively designed, dependable system which is ideally suited for indoor use in small or large businesses, offices, institutions or homes. This equipment is specially designed so that each set may be used either as a desk set or a wall set. This flexibility makes it easy to locate or relocate any set wherever it is needed.

A ringing circuit, incorporating the sensitivity of USI Sound Powered instruments, has been developed especially for these systems. A distinctive tone is produced in the telephone instruments by means of an interrupter activated by two flashlight cells per system. The interrupters draw practically no current and the flashlight cells will last as long as their storage life on a shelf which is usually two years. The ringing signal cannot sound when the handset at the called station is in use.

The internal assembly of the base is as shown below. All operating parts are readily accessible when the plastic cover is removed by loosening two screws on the bottom. Installation wires are easily connected at the marked terminal strips before the self-positioning plastic cover is replaced. No. 22 AWG, or larger, is recommended for interstation wiring.

These telephone sets are carefully designed and built to reduce maintenance to an absolute minimum. Construction is sturdy and fully protected against corrosion. If the extreme distance between stations is more than one-half mile, it may be advisable to use one or more additional flashlight cells to increase loudness of tone signals.

No. 22 AWG for ringing up to $\frac{1}{2}$ mile with 2 cells (3 volts); up to 1 mile with 4 cells (6 volts).
No. 19 AWG for ringing up to 1 mile with 2 cells (3 volts); up to 2 miles with 4 cells (6 volts).
No. 16 AWG for ringing up to 2 miles with 2 cells (3 volts); up to 4 miles with 4 cells (6 volts).

For overhead wiring, with 40% conductivity solid Copperweld wire, use:

No. 18 AWG up to $\frac{1}{4}$ mile with 2 cells (3 volts); up to 1 mile, 4 cells (6 volts).
No. 14 AWG up to $\frac{1}{2}$ mile with 2 cells (3 volts); up to 2½ miles, 4 cells (6 volts).
No. 12 AWG up to 2 miles with 2 cells (3 volts); up to 4 miles, 4 cells (6 volts).

For overhead wiring, with 30% conductivity solid Copperweld wire, use:

No. 14 AWG up to $\frac{1}{2}$ mile with 2 cells (3 volts); up to 1 mile, 4 cells (6 volts).
No. 12 AWG up to 1 mile with 2 cells (3 volts); up to 2 miles, 4 cells (6 volts).
No. 10 AWG up to 2 miles with 2 cells (3 volts); up to 4 miles, 4 cells (6 volts).

Batteries having more than 6 volts potential may be used, but with this limitation: The voltage developed across the ringing terminals of the nearest station should not exceed 6 volts. Therefore, it may be seen that the size of the ringing battery is determined by its location in the system.

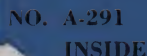
Twisted pairs are necessary where interstation conductors are run in a cable.

Station Components
Each station consists of a telephone handset, USI No. A-276, with 4-foot flexible braid cord and a base containing the control and ringing switches, an interrupter for the ringing signal, and two terminal boards fitted with terminals, for the wiring connections. One of two types of 6-foot flexible cordsets, made up of color coded twisted pairs, can be supplied to connect the desk base to the system wiring. Specify system type or drawing number when ordering cordsets.

No. A-335 sets are used for simple systems using only two stations. Its features: requires only one twisted pair, serving both talking and ringing circuits. **One Battery Box, No. A-300** is used near each station for the ringing circuit. When phone is to be used as desk set, **Junction Box No. A-298** and **4-foot Flexible Cordset No. 1690** can be supplied. Weight is approximately 2 $\frac{3}{4}$ lbs. If more than two stations are contemplated use No. A-339 or No. A-291.

No. A-339 sets are used in this system. The number of sets which may be used in a system is not limited. The common talking-code ringing system is economical to install since wiring is kept to a minimum. Only two twisted pairs are required. All sets, except calling station, ring whenever any station in the system is called by pushing the ringing button. One conversation or conference may be held at a time. Each system requires one **Battery Box No. A-300** for the ringing circuit. When phone is to be used as a desk set, **Junction Box No. A-298** and **6-foot Flexible Cordset No. 1868-1** are recommended. Weight is approximately 2¾ lbs.

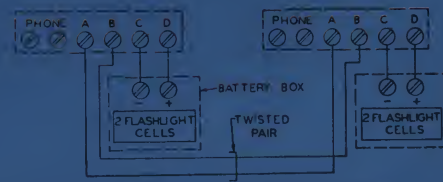
No. A-291 sets are used in this system. Only the selected set is called when designated button is pressed. The complete system accommodates six stations. One conference may be held at a time. One twisted pair is required for the telephones, plus eight single wires for calling or a total of five twisted pairs may be used. Each system requires one **Battery Box No. A-300** for the ringing circuit. When phone is to be used as a desk set, **Junction Box No. A-299** and **6-foot Flexible Cord-set No. 1868-2** are recommended. Weight is approximately 3 lbs.



NO. A-291

Common Turkey — Selective Ringing. Use No. A791. Graham

Common Talking—Code Ringing Use No. A-339 Station



Two Station System. Use No. A-335 Station

SOUND POWERED TELEPHONE SYSTEMS

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